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dot or semicircle filled with water and placed on the head. The heavens with three disks of the sun is understood to mean three days' journey; and landing after a voyage is represented by a tortoise. But there is no evidence to show that the Indians of the north ever advanced beyond the rude attempts which we have thus described."

Lord Kingsborough's publication of "The Mexican Hieroglyphics" shows a higher developed intellect among that people and cannot be placed in the same category with those of the aboriginal Indians of the United States. They are colored, written on paper, and are in many respects equal to the hieroglyphic inscriptions of Egypt.

These most interesting books with their colored picture-writings, copies of which are in the possession of our California Academy of Sciences, are worthy of the cost expended on them and the attention given them by scientific men. They give an idea of the true condition of the inhabitants of Mexico before the landing of Cortez. Max Müller says:—

"One of the most important helps towards the deciphering of the hieroglyphics is to be found in certain American books, which, soon after the conquest of Mexico, were written down by natives who had learned the art of alphabetic writing from their conquerors, the Spaniards. Ixtlilxochitl, descended from the royal family of Tezeuca, and employed as interpreter by the Spanish Government, wrote the history of his own country from the earliest time to the arrival of Cortez. In writing this history he followed the hieroglyphic paintings as they had been explained to him by the old chroniclers. Some of these very paintings which formed the text-book of the Mexican historian, have been recovered by M. Aubin, and as they helped the historian in writing his history, that history now helps the scholar in deciphering their meaning.

It is with the study of works like that of Ixtlilxochitl that American philology ought to begin. They are to the student of American antiquities what Manetho is to the student of Egyptian hieroglyphics or Berosus to the decipherer of the cuneiform inscriptions.

A small part of the hieroglyphics found at the source of the American River, which I have thus described, have been photographed by Mr. Jackson, principal of the Sacramento Art School.

But, for the sake of science, it would be well, it seems to me, to have the whole of the rock-inscriptions photographed and preserved for ethnological and scientific research.

INVOLUNTARY RECOLLECTION.

BY JAS. W. DONALDSON, ELLENVILLE, ULSTER COUNTY, N.Y.

IF one will but organize himself into a society for "psychical research" and, cultivating a habit of introspection, observe carefully even his own mental processes, he will find much to interest and confound him.

And perhaps no other operations of his mind will furnish him with more occasion for thought and investigation or prove more interesting and suggestive than some of the vagaries of *involutionary* recollection.

There are few persons indeed of ordinary intelligence to whom this at times strangely spontaneous habit of memory is not a familiar, recognized experience, exciting more or less their wonder and speculation.

For example, we can all recall occasions when, though however earnestly engaged with other thoughts, we have all at once awakened to the discovery that we were at the same time unconsciously humming a snatch from some old song, or mentally repeating a fragment of prose or verse learned in our childhood, which we had supposed was long since buried so deep down under the *débris* of years as to be beyond the hope of resurrection; yet there it was, as fresh and vivid as ever, having, with a dash of its old-time irrepressibility and abandon, burst in upon our consciousness again without so much as asking "by your leave."

We may remember, too, that it has often happened that these unexpected visitants were of a character to cause us much dis-

comfort and humiliation, for we have found by sad experience that we may not easily "pluck from memory a rooted sorrow," nor "raze out the hidden troubles of the brain;" and, worse than all, that the "damned spot" will never "out," however frantic and agonizing may be our entreaty. Indeed, it is impressed upon us that, if there be any of our memories which are more perverse and persistent than others, it is the erratic, or disreputable ones, which we have thoughtlessly garnered and forced into unnatural companionship with our graver and better impressions. These will return again and again in spite of us, and it seems, as if with malicious intent, that they often delight in choosing opportunities when it is most to our embarrassment and mortification.

Perhaps we are at a funeral, and have become touched and subdued by the saddening ceremonies, or at church, earnestly engaged with its impressive services, when, all at once, without warning, one of these irreverent sprites of memory, with cap and bells and many a comic antic, breaks in upon our serious mood, and, wantonly disregarding the sanctities of the occasion, makes mouths at its solemnities. Or it may be that sometime when in the midst of a scene of innocent mirth and jollity the ghost of an unavailing remorse, or the shadow of an event in our life full of shame and agony, may suddenly appear to sadden and sober us and dissipate our enjoyment.

The writer recalls an incident in his own experience illustrating the sometimes strange unexpectedness of this phase of recollection.

Many years ago he was moved to memorize certain quaint and amusing verses found in a newspaper. On a March day long after, as he was riding out of Albany, and in a comfortable and complacent mood listlessly gazing out of the car window upon the bedraggled and cast-off garments of a rough and dissipated winter, suddenly these verses, committed over thirty years before, broke in upon his thoughts and began to reel themselves off with the startling abruptness and unmanageable spontaneity of a wayward alarm-clock.

Perhaps it was more than twenty years since they had last occurred to him. He tried in vain to discover what in all that dreary, forbidding landscape, or in the nature of his thoughts, had set this jangling waif of memory agoing, but could not in any way account for it; nothing in his mind seeming to bear the remotest relation to it. Apparently, as if obedient to some unexplained law of periodicity, this disreputable tramp of the brain had, in its vagabond wanderings, rounded its period, and, with an impudent smirk and an affected wail of distress, there it was again, begging, "for Christ's sake," a dole of recognition at the open door of an unwilling and repelling consciousness.

Possibly, if we accept the later, and what seems the more reasonable, conception of consciousness, that is, that it is not all of memory, but merely one of its phases or conditions, and a dependent, unstable one at that, we can the better account for some of these freaks of spontaneous recollection.

It is evident that a normal brain has more or less control over that which shall cross the threshold of consciousness, for we know many persons have the faculty of so absorbing themselves with any certain line of thought as to be seemingly quite oblivious for the time to everything else not pertinent to it.

But, while it may appear that they are generally successful in thus holding the door against a besieging host of interloping and disturbing recollections, yet even they, too, sometimes fail to make the exclusion completely effectual.

Indeed, because of the very intensity of their thinking and their unusual turmoil of brain, they are likely to arouse and quicken other associations having certain constituent elements in common with those entering into the texture of their main thought, and these, too, may sneak into cognition along with the invited guests in spite of their every precaution.

Again, with the majority of persons, "mind wandering" is more or less a besetting infirmity. The spring which holds the door of their consciousness either has a congenital weakness or has become more and more impotent because of disease or approaching senility, and is therefore capable of offering little resistance to any strays of memory which may seek to enter. In fact, so degenerate do some minds become, that consciousness,

once a guarded and sacred preserve, is now a commons or thoroughfare through which any vagrant, motley procession of thoughts may troop at will without let or hindrance.

No doubt, too, this open, unguarded condition of consciousness may come upon us at times simply from our relaxing nervous tension, as when we unharness the will and turn it loose, and lapse generally into a state of mental passivity and listlessness. It is then that, finding the door left ajar, these unbidden recollections oftenest make their intrusive entrance.

Perehance, too, Unconscious Cerebration may take advantage of the situation to display and call attention to some of its remarkable curios, and, abusing the opportunity, lug in with these certain annoying remembrances which we would it had left in undisturbed oblivion.

Perhaps one of the most significant and suggestive revelations that comes to us from a thoughtful observation of these extraordinary phenomena of involuntary recollection, is the abundant proof they furnish us of the unexpected and marvellous tenacity of our impressions.

It is made very manifest that those potential organic conditions which were set up and established in the original process of developing these impressions are still preserved to us intact, and need only the proper excitant or stimulus to revive and rehabilitate them for us again and again.

Being well assured of this, it would seem profitable for us to inquire to what extent, not yet realized, can we, by a deliberate and persistent exercise of the will, control and compel these conditions of revival.

We are all conscious of doing a good deal of recollecting by *voluntary* effort, but it is mostly those ordinary experiences which are comparatively recent and fresh. When it comes to making labored and prolonged effort to restore some elusive and faded image of a remote past, we are easily discouraged, and, even though it be a momentous event in our lives, a vivid and complete recollection of which might save us from dishonor or utter ruin; yet, after making a few hopeless and abortive attempts to remember, we are apt to give up in despair, when, perhaps, had we been fully possessed with an abiding faith in the enduring nature of our impressions and in the possibility of our reviving them, no matter how remotely fixed, we might have hopefully and courageously continued our efforts, even for days or weeks if necessary, until the missing fact was again brought into the fold of consciousness.

Surely, if, as has often happened in human experience, grave accidents or emergencies have resulted in so quickening and rehabilitating certain conditions of the brain as to fully restore to the person recollection of events long supposed to be irretrievably lost, it demonstrates the reasonableness of our employing and confidently relying upon systematic and patient effort to compel the same active and exalted mental conditions to produce the same happy result.

THE ARRANGEMENT AND NUMBER OF EGGS IN THE NEST.

BY DR. MORRIS GIBBS, KALAMAZOO, MICH.

ALL birds have a system or arrangement in depositing their eggs in the nest, and there are very few species, if any, in which some peculiarity is not to be seen, if careful observation is made. Many birds so plainly and invariably show a tendency to a set arrangement that their habit is generally known. It is of these well-known examples that we will speak.

The loon or great northern diver always deposits two eggs. They are almost perfectly elliptical in shape and lie side by side. The eggs are invariably found at over three-fifths of the distance from the front edge of the nest depression, that is, at about two-fifths of the long diameter from the rear end of the elongated hollow or nest proper. From the position of the eggs one can tell how the bird sits on the nest, as we may reason that, with these long-bodied birds, the abdomen, which supplies the direct heat, is well back from the front of the hollow. This theory is verified by watching the incubating bird. The turtle dove, night-hawk,

whippoorwill, and common domestic pigeon, each of which lays two eggs at each setting, deposit the eggs side by side, although this arrangement is frequently interfered with in the case of the tame bird, not rarely with the result that one of the eggs does not hatch.

The spotted sandpiper and killdeer plover, and I presume most of the other snipe and plover, lay four eggs at a clutch. The eggs are arranged in the nest, or on the bare ground, with their small ends together, and, as they are pyriform in shape, they join in to perfection. The eggs of the snipe and plover groups are proportionately exceeding large for the size of the bird, and the saving of space by this arrangement undoubtedly answers a purpose. It is impossible to offer a solution to this problem of order at present, unless we may suggest that it is a wise provision of some ruling power, which so ordains the arrangement which best admits of the bird's covering the eggs thoroughly. It is fair to doubt if a sandpiper could cover her four large eggs if they were arranged in any other position besides that in which they are found, with the four smaller ends pointing to a centre. This species has a small body and is not provided with loose, fluffy feathers, so well supplied to many grouse and other birds which lay many eggs. On two occasions the order of the eggs in nests of the spotted sandpiper was broken by us; an egg being turned about with its point presented outward. One of these nests was deserted, perhaps from the interference, but in the other the order was found restored within a day.

Perhaps no bird in America, certainly no other in Michigan, equals the common bob-white or quail in the number of eggs it sets upon. This species not infrequently lays eighteen eggs, and even more are found in one nest, but I can assure the readers that with any other shaped eggs the bob-white could never succeed as a successful setter. I will suggest that my friends with collections at hand compare a set of twenty eggs of the quail with twenty eggs of equal dimensions in longer and shorter diameter of any other species, and observe which lot occupies the smaller space. We may say, for illustration, that the bob-white's egg is triangular, and fits in as no other egg, to my knowledge, can.

With all birds which lay a good-sized clutch, so far as my observations go, the eggs are deposited in almost an exact circular group. The bird must use excellent judgment in thus arranging them, for it is only by this order that they can all be covered properly. Not infrequently when a grouse is startled from her eggs she tumbles one of her treasures from its bed. If the egg is not too far removed, it will almost invariably be found returned to its exact position in the nest within a few hours.

I have been informed that the brown pelicans steal eggs from one another's nests, in order to fill their complements, or at least take possession of those they find lying on the ground and roll them into their nests. Although this does not seem at all likely, for various reasons, I cannot dispute it authoritatively, and, moreover, there were strong proofs that such was the case in many nests that I examined in Florida. These nests, which were near together, often contained four eggs, never more; one to three of which were ready to hatch, the others being fresh, or nearly so. And, again, there would be eggs in the same nest with young over a week old, or young of ages quite ten days variation. But one point was ever observable, the young, or eggs, or both, never exceeded four in number, showing, even if the charge of abduction is proven, that the old birds know their limit.

The cow-blackbird, in imposing its eggs on the care of other birds, not rarely fails in the arrangement of affairs. It is fair to allow that the cow-bird is perfectly able to distinguish its own eggs from those of the blue-bird, chipping-sparrow, and others, which differ radically in size and color from its own speckled, tough-shelled eggs; but I believe it often fails to distinguish its eggs from the quite often similar ones of the chewink and oven-bird. And this failure accounts for its depositing as high as four and five eggs in the nests of the chewink, where there was but one egg of the owner; and again laying four eggs in an oven-bird's nest, which contained no eggs at all of the owner,—both cases undoubtedly oversights, which resulted from its inability to distinguish. It is reasonable to allow that cow-birds have limits as to the number to be deposited, otherwise some unfortunate warbler